

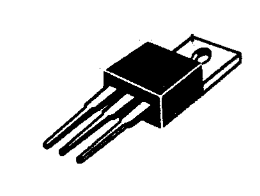
SWITCHMODE SERIES NPN POWER TRANSISTORS

... designed for use in high-voltage,high-speed,power switching in inductive circuit, they are particularly suited for 115 and 220 V switchmode applications such as switching regulator's,inverters,DC -DC conveter, Motor control, Solenoid/Relay drivers and deflection circuits.

NPN

MJE13002
MJE13003

1.5 AMPERE
POWER
TRANASISTORS
300-400 VOLTS
40 WATTS



TO-220

FEATURES:

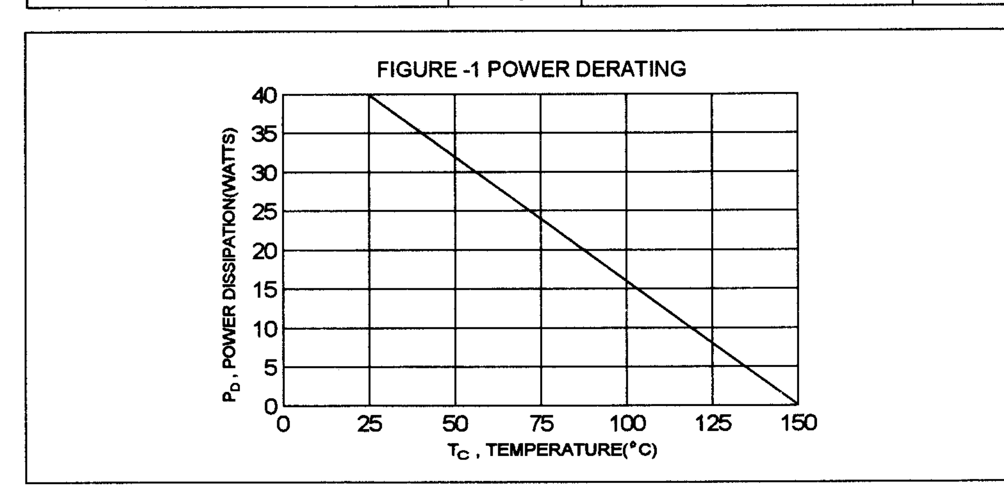
*Collector-Emitter Sustaining Voltage-
$V_{CEO(SUS)}$ = 400 V and 300 V
* Collector-Emitter Saturation Voltage -
$V_{CE(sat)}$ = 1.0 V (Max.) @ I_C = 1.0 A, I_B = 0.25 A
* Switching Time - t_f =0.7 us (Max.) @ I_C =1.0 A

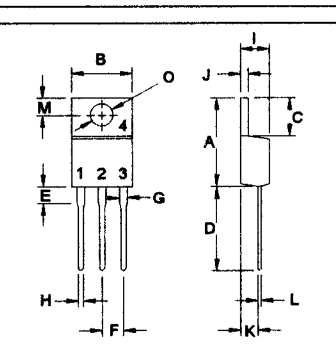
MAXIMUM RATINGS

Characteristic	Symbol	MJE13002	MJE13003	Unit
Collector-Emitter Voltage	V_{CEO}	300	400	V
Collector-Emitter Voltage	V_{CEV}	600	700	V
Emitter-Base Voltage	V_{EBO}	9.0		V
Collector Current - Continuous - Peak	I_C I_{CM}	1.5 3.0		A
Base current	I_B	0.75		A
Total Power Dissipation @T_C = 25°C Derate above 25°C	P_D	40 0.32		W W/°C
Operating and Storage Junction Temperature Range	T_J ,T_{STG}	-65 to +150		°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction to Case	Rθjc	3.12	°C/W





PIN 1.BASE
2.COLLECTOR
3.EMITTER
4.COLLECTOR(CASE)

DIM	MILLIMETERS	
	MIN	MAX
A	14.68	15.31
B	9.78	10.42
C	5.01	6.52
D	13.06	14.62
E	3.57	4.07
F	2.42	3.66
G	1.12	1.36
H	0.72	0.96
I	4.22	4.98
J	1.14	1.38
K	2.20	2.97
L	0.33	0.55
M	2.48	2.98
O	3.70	3.90

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

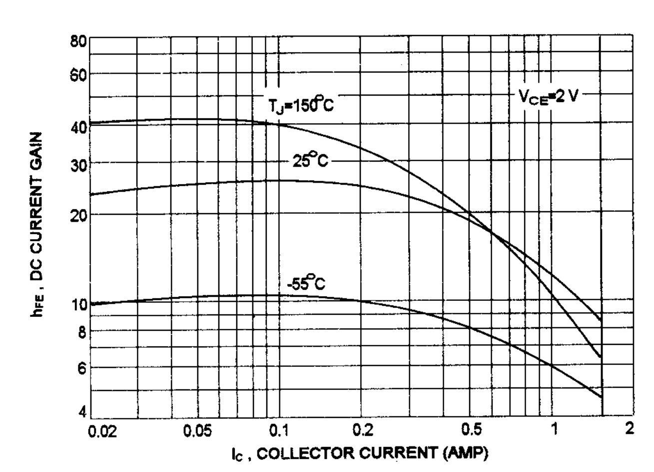
Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage (I_C= 10 mA, I_B= 0) MJE13002 MJE13003	$V_{CEO(sus)}$	300 400		V
Collector Cutoff Current (V_{CEV}= Rated Value, $V_{BE(off)}$=1.5 V) (V_{CEV}= Rated Value, $V_{BE(off)}$=1.5 V , T_C=100 °C)	I_{CEV}		1.0 5.0	mA
Emitter Cutoff Current (V_{EB}= 9.0 V, I_C= 0)	I_{EBO}		1.0	mA
ON CHARACTERISTICS (1)				
DC Current Gain (I_C= 0.5 A, V_{CE}= 2.0V) (I_C= 1.0 A, V_{CE}= 2.0V)	hFE	8.0 5.0	40 25	
Collector-Emitter Saturation Voltage (I_C= 0.5 A, I_B= 100 mA) (I_C= 1.0 A, I_B= 250 mA) (I_C= 1.5 A, I_B= 0.5 A)	$V_{CE(sat)}$		0.5 1.0 3.0	V
Base-Emitter Saturation Voltage (I_C= 0.5 A, I_B= 100 mA) (I_C= 1.0 A, I_B= 250 mA)	$V_{BE(sat)}$		1.0 1.2	V
DYNAMIC CHARACTERISTICS				
Current Gain - Bandwidth Product (I_C = 100 mA , V_{CE} = 10 V ,f = 1.0 MHz)	f_T	4.0		MHz

SWITCHING CHARACTERISTICS

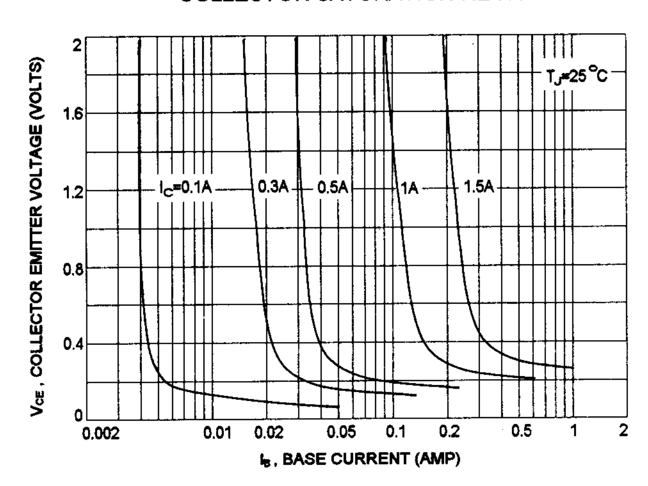
Characteristic	Conditions	Symbol	Min	Max	Unit
Delay Time	V_{CC} = 125 V, I_C = 1.0 A I_{B1} = -I_{B2} =0.2A, tp = 25 us,Duty Cycle ≦1 %	t_d		0.1	us
Rise Time		t_r		1.0	us
Storage Time		t_s		4.0	us
Fall Time		t_f		0.7	us

(1) Pulse Test: Pulse Width =300 us,Duty Cycle ≦ 2.0%

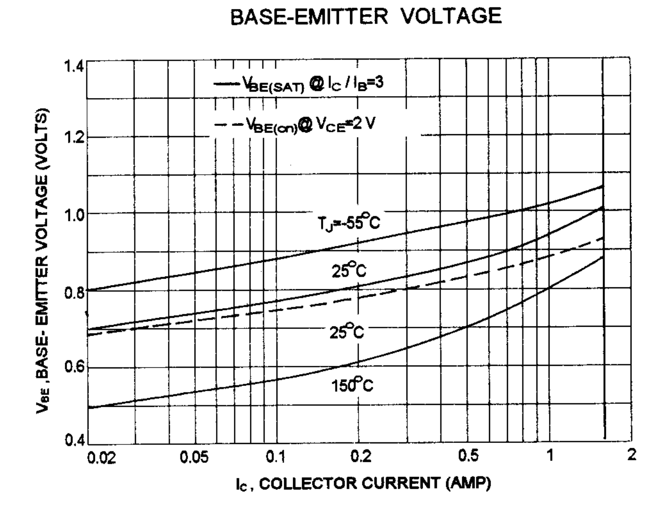
DC CURRENT GAIN



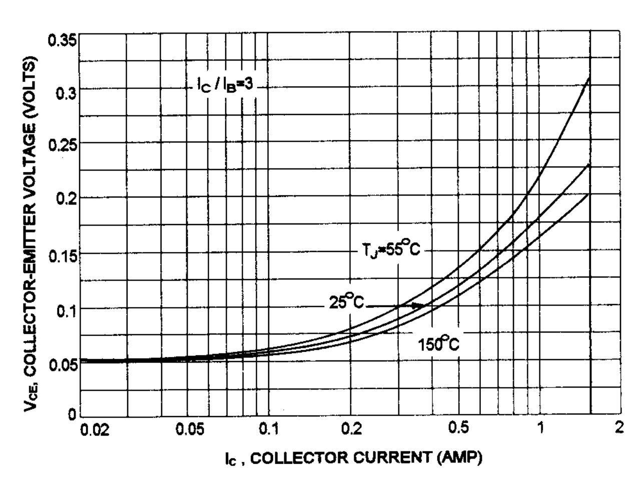
COLLECTOR SATURATION REGION



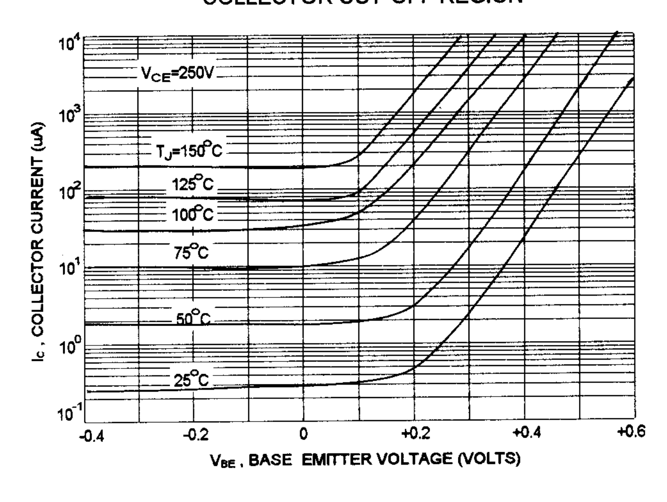
BASE-EMITTER VOLTAGE



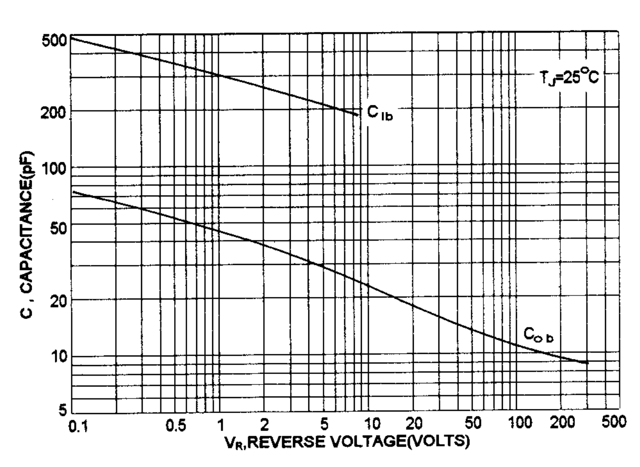
COLLECTOR-EMITTER SATURATION VOLTAGE

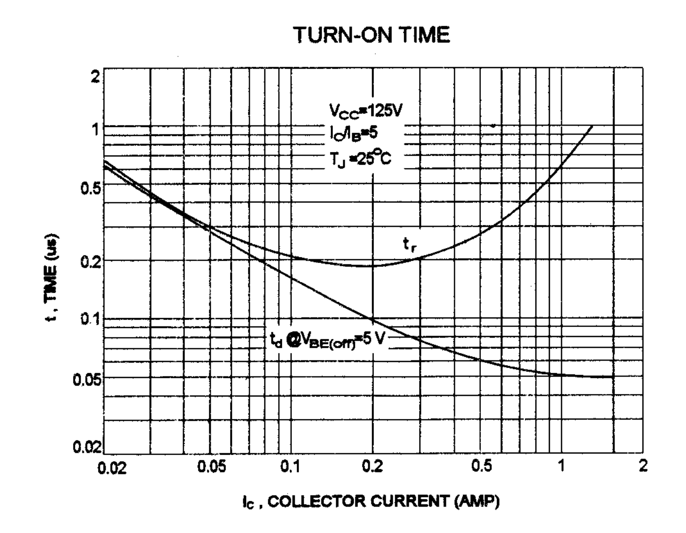


COLLECTOR CUT-OFF REGION

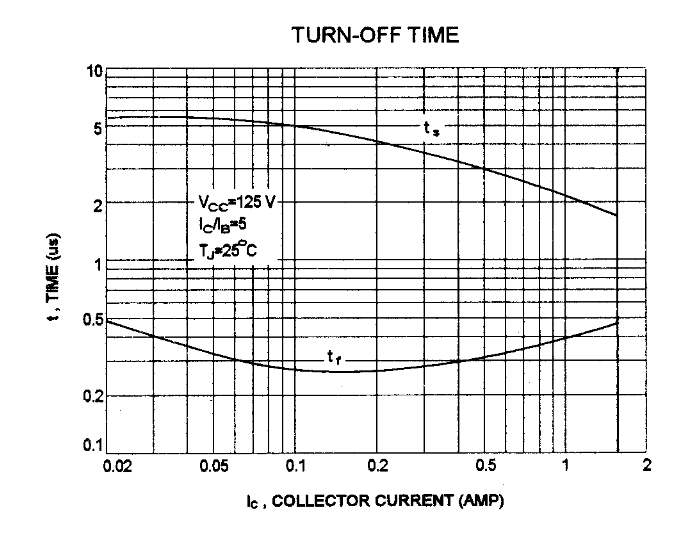


CAPACITANCE

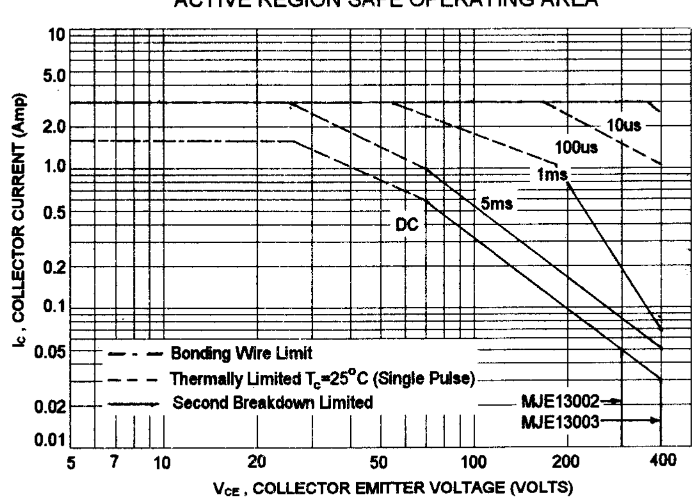




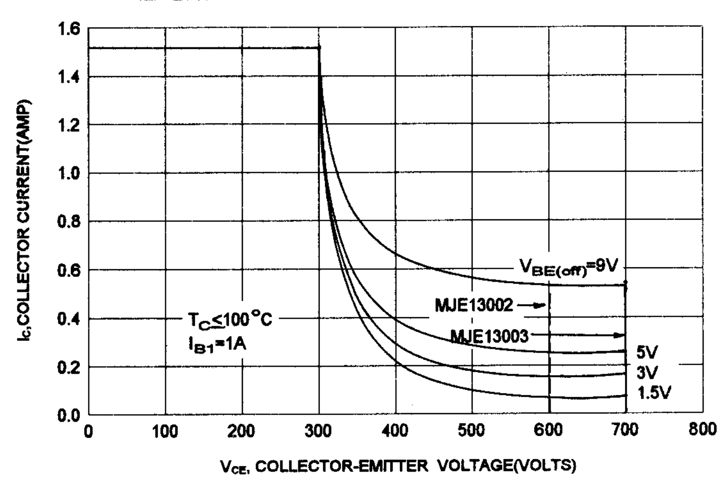
TURN-ON TIME
V_{CC}=125V
I_C/I_B=5
T_J=25°C
t_r
t_d @$V_{BE(off)}$=5 V
t , TIME (us)
I_C , COLLECTOR CURRENT (AMP)



TURN-OFF TIME
V_{CC}=125 V
I_C/I_B=5
T_J=25°C
t_s
t_f
t , TIME (us)
I_C , COLLECTOR CURRENT (AMP)



ACTIVE REGION SAFE OPERATING AREA
10us
100us
1ms
5ms
DC
Bonding Wire Limit
Thermally Limited T_c=25°C (Single Pulse)
Second Breakdown Limited
MJE13002
MJE13003
I_C , COLLECTOR CURRENT (Amp)
V_{CE} , COLLECTOR EMITTER VOLTAGE (VOLTS)



REVERSE BIAS SWITCHING SAFE OPERATING AREA
$V_{BE(off)}$=9V
MJE13002
MJE13003
5V
3V
1.5V
$T_C \leq 100$°C
I_{B1}=1A
I_C,COLLECTOR CURRENT(AMP)
V_{CE}, COLLECTOR-EMITTER VOLTAGE(VOLTS)